

# S&C 5800 Series Automatic Switch Control

## Replacing 5800 Series Front Panel Processor Board - For DUART Chip Replacement

### TABLE OF CONTENTS

Section	Page
<b>INTRODUCTION</b>	
Qualified Persons . . . . .	2
ESD Damage . . . . .	2
General Information . . . . .	2
Serial Numbers . . . . .	3
Tools . . . . .	4
Installation Kit . . . . .	4
<b>PROCESSOR BOARD REPLACEMENT</b>	
Preparation and Data Preservation . . . . .	5
Remove the Processor Board . . . . .	7
Install the New Processor Board . . . . .	10
Restore Control Memory . . . . .	10
Normal Operation . . . . .	11
<b>SOFTWARE UPDATE USING ONLY THE BATTERY</b>	
Software Update With Battery Only . . . . .	12
<b>SEND THIS INFORMATION TO S&amp;C</b>	
Transmit this Form to S&C . . . . .	13





## Qualified Persons

### WARNING

The equipment covered by this publication must be installed, operated, and maintained by qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards. A qualified person is one who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from non-live parts of electrical equipment.
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed.
- The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment.

These instructions are intended only for such qualified persons. They are *not* intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

## ESD Damage

### CAUTION

When replacing the processor circuit board, precautions must be taken to prevent static discharge, which can damage not only the existing circuit board but its replacement as well.

Although the replacement circuit board is furnished in special protective packaging, the use of a common-point-grounded wristband is required. The wristband must be connected to the enclosure ground point and worn during removal, handling, and reinstallation of the processor circuit board.

Always be careful not to touch your hand or clothing to any component pin or cable connector on the processor circuit board.

## General Information

This document describes how to replace the front panel processor circuit board in an S&C 5800 Series Automatic Switch Control. The existing circuit board is equipped with a Philips DUART (Dual Universal Asynchronous Receiver Transmitter) integrated circuit, positioned at location U11 on the circuit board. See Figure 1. The replacement circuit board is equipped with an Exar DUART integrated circuit. The replaced processor circuit board must be returned to S&C.

The associated high-voltage equipment does not need to be de-energized to change out the processor board, but the control must be de-energized. The control will need to be reconfigured, after the processor board has been replaced, using the “S&C Memory Restore” software included in the kit.

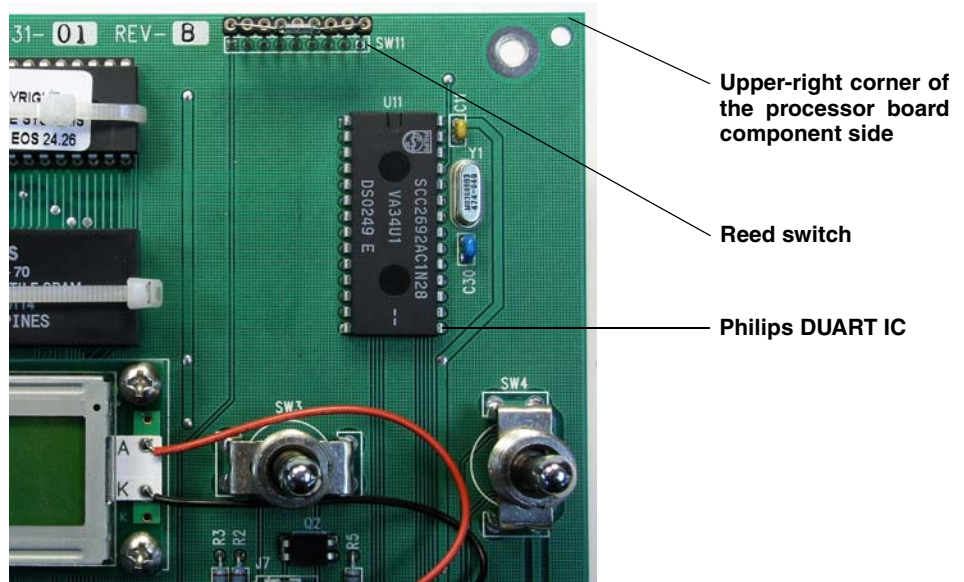


Figure 1. Philips DUART IC.

## Serial Numbers

The serial number of your 5800 Series Automatic Switch Control is listed on the faceplate label. Please check the last four digits of the serial number against the serial numbers listed in the table below to make certain your control was furnished with a processor circuit board utilizing the Philips DUART integrated Circuit.

Serial Numbers (Last 4 Digits) of 5800 Series Automatic Switch Controls Furnished with Philips DUART IC			
3862 - 3863	4268 - 4273	4388 - 4401	4509 - 4518
3876 - 3878	4277 - 4284	4406 - 4418	4536 - 4542
3891	4286 - 4295	4420	4545 - 4547
3895	4297 - 4317	4423 - 4425	4550 - 4645
3897 - 3936	4319 - 4328	4433 - 4441	4647
3938 - 4080	4330 - 4349	4445 - 4462	4653
4094 - 4244	4351 - 4360	4465 - 4479	
4251 - 4256	4362 - 4386	4484 - 4496	

For example: Serial Number ASC20030300**3862** is on the list.

If you installed a processor circuit board in a control during the period from April 1, 2003 to January 19, 2004 (for 5801 Controls) or from June 25, 2003 to January 19, 2004 (for 5802 Controls), or if you have processor circuit boards in stock that you received during that period, please check these circuit boards to see if they were furnished with the Philips DUART IC. If so, please contact S&C for a replacement board(s).



### **⚠ IMPORTANT**

Please write down the serial number of each control in which you have replaced the processor circuit board, and provide that serial number to S&C.

## **Tools**

You will need the following tools to remove and replace the processor circuit board:

- #2 Phillips head screw driver
- ESD wristband (Contact S&C if you need this part.)
- PC Laptop Computer with a Serial Port, loaded with software for your 5800 Series Automatic Switch Control
- Straight-Through Serial Cable (male to female)

## **Installation Kit**

Item #	Description	Qty.
1	5800 Series processor circuit board: Model 5801 = PN 006-001053-01 or Model 5802 = PN 006-001053-02	as ordered
2	New ESD protective circuit board bag	1
3	Installation Instructions 1041-618B	1
4	Diskette with <b>SandC-MemRestore.exe</b> file	1
5	ESD Wristband, with alligator clip	1



# PROCESSOR BOARD REPLACEMENT

## Preparation and Data Preservation

1. Read and understand all of these instructions before starting board replacement.
2. Use Windows Explorer to create a new folder: **SandC Memory Restore** on the “C” drive of your PC laptop computer. From the floppy disk supplied with these instructions (or from the S&C Information Center) transfer the file: **SandC-MemRestore.exe** to this new folder. Then double click to run: **SandC-MemRestore.exe**. It will extract other files to the folder: **C:\SandC Memory Restore**. You will use these files to automatically capture memory data from the processor board being replaced and load that memory into the new processor board.
3. Static electric charges can corrupt memory chips on circuit boards.
  - Do not touch the soldered pins or traces on the back of the circuit board.
  - Keep the replacement circuit board in its ESD protective bag until you are ready to install it.
  - Immediately put the replaced circuit board in the extra ESD protective bag furnished.
  - Wear the grounded ESD wristband when handling, removing, and installing circuit boards.
4. Make sure the switch control enclosure is properly grounded.
5. For switch controls installed in pad-mounted gear, verify that all the operators are decoupled.
6. Check the LCD, is the Team in **RDY** (Ready) status? This information is needed for Step 3 on Page 10.
7. Check the switch control serial number (on the faceplate label) against the serial number list on Page 3, to make certain that the circuit board was furnished with the Philips DUART IC.
8. Place the **AUTOMATIC OPERATION** switch in the **DISABLE** position. Wait at least three minutes for the change in state to be passed among the team members.
9. Place the **REMOTE/LOCAL** switch in the **LOCAL** position.
10. The switch control should be operated with both battery and control power, or with both battery and sensor power. If you must use battery power only, read the information on page 11, and then continue with these instructions.
11. Connect the serial port of your laptop personal computer to the **LOCAL COMM. PORT** on the switch control faceplate. On your computer select **Start > Programs > EnergyLine** and then double-click **IntelliLINK**. IntelliLINK Setup Software will connect to the switch control.
12. If connection to the control fails, the progress box at the lower left of the Options dialog window will display “Not Connected”. Select the **Communication Setup** tab. Change the Serial Comm Port to **COM2** (or the computer Comm Port connected to the 5800 Series), and click **Connect**. See Figure 2.

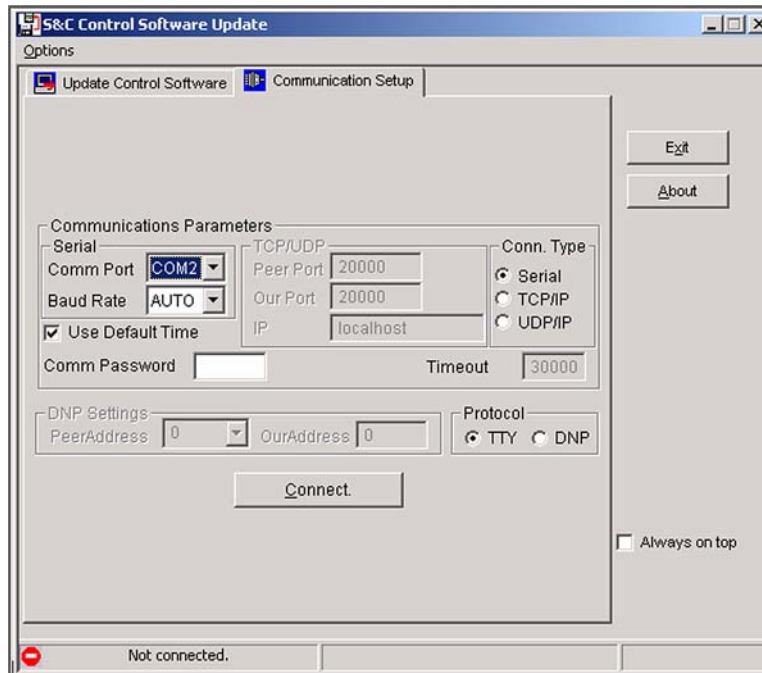


Figure 2. IntelliLINK Communication Setup dialog window.

13. The Local Operation screen will open. In the Windows Menu Bar select **File > Save Snapshot**. This will create a **.vm file**. Name the **.vm file** with the switch control serial number and save it in the folder: **C:\SandC Memory Restore**. This is the reference file for all control software information as it exists before processor board replacement.
14. Close the IntelliLINK window. This will stop IntelliLINK and disconnect from the switch control.
15. Use Windows Explorer to open the folder: **C:\SandC Memory Restore**.  
The file **SandC\_Extract.bat** will be used to capture and save the switch control operating system and all control memory. This information will be automatically saved in the SandC Memory Restore folder as file **code\_data.cod**. After the new processor board has been installed, you will use the file **SandC\_Restore.bat** to automatically take the information saved in **code\_data.cod** and reload it into the switch control. This will restore the exact operational state of the switch control before board replacement. You will also make a copy of the file **code\_data.cod** and rename it with the switch control serial number, to archive its operating system and memory.
16. Double-click the file **SandC\_Extract.bat**. The **S&C Control Software Update** window will appear. In the lower-left corner, switch control connection status is shown. When connection has been established, it will display: **COM1: Connected at 9600 TTY**. A different communication baud rate may be shown. Do not change any option displayed in this window.
17. Click the window button: **START UPDATE**. An **Extracting code and data. Proceed?** dialog selection box will appear. Click the **YES** button.
18. All faceplate displays will turn-off and system extraction will begin. At the lower right corner of the **S&C Control Software Update** window, the percent of extraction progress is shown. Depending on how much data has been stored in the control, **system and memory extraction will take approximately 5 minutes**.



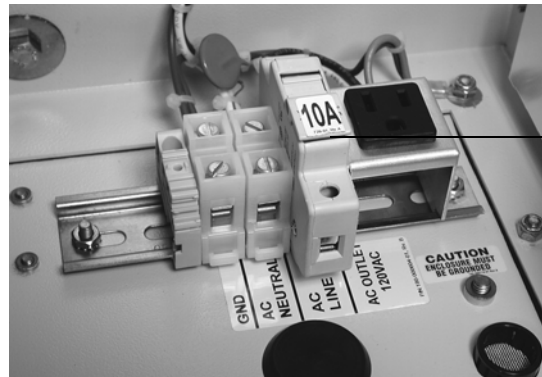
### **⚠ IMPORTANT**

Do not disconnect the serial cable or operate the computer until the operating system extraction process has completed and the progress indicator shows: **TASK COMPLETED!**

19. At the end of system extraction a **Software Update Completed Successfully. Exit?** dialog selection box will appear. Click the **YES** button.
20. Control data has been automatically saved in folder **C:\ Sand C Memory Restore** as file **code\_data.cod**. Disconnect your computer from the **LOCAL COMM. PORT**.

## **Remove the Processor Board**

1. Open the faceplate panel by rotating the two securing fastener knobs counterclockwise. Swing open the front panel and secure it with the retaining latch.
2. The processor board is mounted on the top rear of the faceplate panel.
3. For controls utilizing 110-Vac power, open the AC Line Fuse to disconnect control power. The fuse is located on the floor of the enclosure. See Figure 3.



AC line fuse

**Figure 3. AC line fuse.**

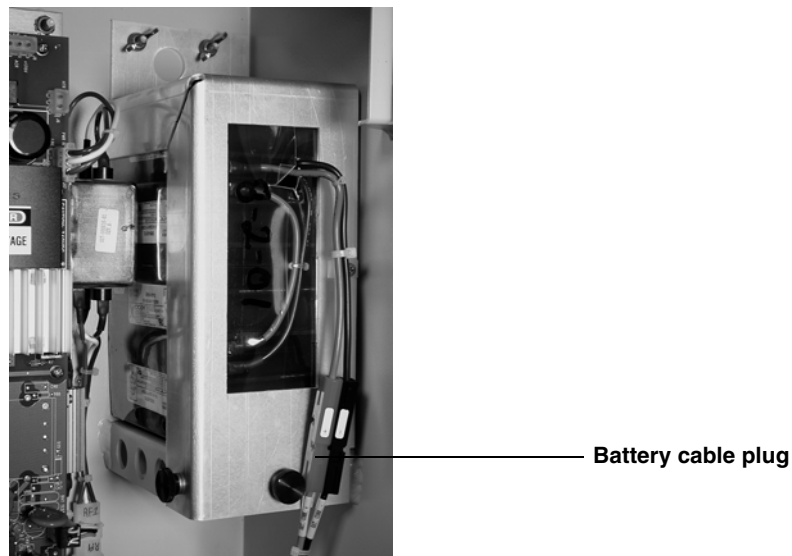
4. Unlock the padlock and remove the FIC plug from the bottom of the enclosure. See Figure 4.



**Figure 4. FIC plug on the bottom of the enclosure.**



5. Unplug the battery to disconnect dc power. See Figure 5.



**Figure 5. Battery and bracket showing the Battery Plug in the cable.**

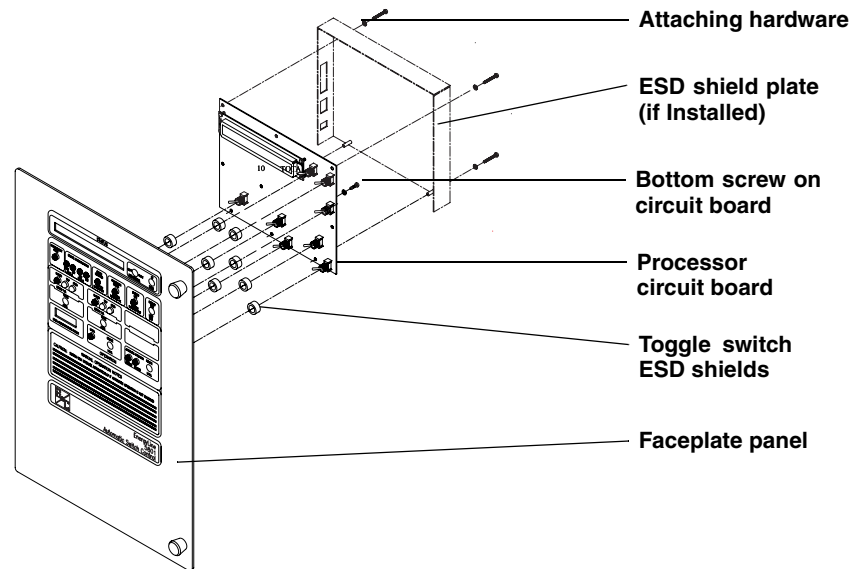
6. Put on the ESD wristband and connect its cable to the ground terminal on the bottom of the enclosure. See Figure 6.



**Figure 6. Ground terminal on bottom of the enclosure.**

7. Disconnect all cables from the processor board.
8. If an ESD shield plate has been installed on the switch control, remove the four screws and associated hardware that attach it and the shield. Remove the bottom screw at the center of the circuit board. See Figure 7. If no shield has been installed, unscrew the five screws that attach the circuit board. Gently pull the board away from the panel to release it from the spring locator pins. Be careful not to lose any of the toggle switch ESD shields. Also be careful not to damage the fragile reed switch at position SW11. See Figure 1.





**Figure 7. Processor board and mounting hardware on back of faceplate.**

9. Verify that the DUART IC was manufactured by Philips. See Figure 1. **If it is an Exar DUART IC**—as shown in Figure 8—follow the steps below to reinstall the original processor board. There is no need to restore control memory.
10. Remove the toggle switch ESD shield grommets from the circuit board.
11. Put the replaced processor board in the supplied ESD protective bag.



**Figure 8. Exar DUART IC.**



## Install the New Processor Board

1. Remove the new processor board from its ESD protective bag. (Save the bag, to use when removing the processor board from another 5800 Series Switch Control.)
2. Install the toggle switch ESD shield grommets on the board.
3. Attach the new processor board and the ESD shield plate (if applicable) to the faceplate, using the existing hardware. See Figure 6.
4. Reconnect all cables to the processor board. Make sure that all connectors are correctly seated and locked.
5. Disconnect the ESD wristband cable from the ground on the bottom of the enclosure, and remove your wristband.
6. Reconnect the battery plug. See Figure 4.
7. Reattach the FIC plug to the socket on the bottom of the enclosure, and secure it with the padlock-collar and padlock. See Figure 3.
8. For controls utilizing 110-Vac control power, close the AC Line Fuse to connect power. See Figure 2.
9. Close the faceplate panel and secure it with the two fastener knobs.

## Restore Control Memory

1. The switch control should be operated with both battery and control power, or with both battery and sensor power. If you must use battery power only, read the information on page 11, and then continue with these instructions.
2. Connect the serial port of your laptop computer to the **LOCAL COMM. PORT** on the switch control faceplate. Open the folder: **C:\SandC Memory Restore**.
3. Double-click the file **SandC\_Restore.bat**. The **S&C Control Software Update** window will appear. In the lower-left corner switch control connection status is shown. When connection has been established it will display: COM1: Connected at 9600 TTY. A different communication baud rate may be shown. Do not change any option displayed in this window.
4. Click the window button: **START UPDATE**. A **Restoring code and data, Proceed?** dialog selection box will appear. Click the **YES** button.
5. All faceplate displays will turn off and system restoration will begin. At the lower right corner of the **S&C Control Software Update** window, the percent of restoration progress is shown. Depending on how much data has been stored in the control, **system and memory restoration will take approximately 5 minutes**.

### **⚠ IMPORTANT**

Do not disconnect the serial cable or operate the computer until the system restoration process has been completed and the progress indicator shows: **TASK COMPLETED!**

6. At the end of system restoration, a **Software Update Completed Successfully. Exit?** dialog selection box will appear. Click the **YES** button.
7. The restoration information for this switch control has been automatically saved in folder **C:\Sand C Memory Restore** as the file **code\_data.cod**. If desired you can save a copy of this file in the folder and rename it with the switch control serial number. This will archive all existing control information, and give you a serial number list of all switch controls with new processor boards.



### **⚠ WARNING**

The serial number named .cod file is archival for a specific control on a specific date. You should never use this file to restore memory into any other switch control, as it will overwrite all the current setting, application code, and logged information in that control.

8. The switch control will now function exactly as it did before processor circuit board replacement.

### **Normal Operation**

1. Place the **REMOTE/LOCAL** switch in the position it was in before you started board replacement.
2. Place the **AUTOMATIC OPERATION** logic back to its original enabled or disabled state.
3. Check the LCD and make sure the Team returns to **RDY** (Ready) status, if it was in **RDY** (Ready) status at Step 6 on Page 5.
4. Disconnect your computer from the **LOCAL COMM. PORT**, and lock the switch control. This completes the processor board replacement procedure.
5. Write the switch control serial number on a piece of paper and insert it in the ESD protective bag of the replaced circuit board.
6. Package and return the processor board to S&C. Write the RMA Number on the package. Please complete the information requested on page 13, put a copy in the package and send it to:

**RMA# \_\_\_\_\_**

**S&C Electric Company  
1135 Atlantic Avenue  
Alameda, California 94501  
Phone: (510) 864-6850**

**Canadian customers** - please contact your local S&C representative to arrange RMA return to S&C Toronto.

7. Please **e-mail the serial number and .vm file for each switch control** with a replaced processor board to the S&C Application Engineer assigned to your project.
8. If you have any questions about these instructions, or the **SandC\_Extract.bat** or **SandC\_Restore.bat** programs, please contact S&C Automation Systems Division - Application Engineering (773) 338-1000 or Fax: (773) 381-4833.



# SOFTWARE UPDATE USING ONLY THE BATTERY

## Software Update With Battery Only

S&C recommends that the switch control have both battery and ac control power (or battery and sensor power, if applicable) when updating control software. If you need to disconnect ac control power (or sensor power) when you update software, then you *must* follow these instructions to override the automatic shut-down.

### Protection System Logic

All functions of the switch control are directed by the CPU, including charging and monitoring of the battery system. If the CPU program stops, the control will not function and the battery or circuits might be damaged. To indicate that the CPU program is functioning properly, it sets a bit on the PS/IO board every few seconds. If that bit goes unset for 60 seconds, the PS/IO board disconnects the battery, shutting down the control and preventing damage to the control circuits and battery.

During the control software extraction or restoration process, the CPU is unable to function and cannot set the bit on the PS/IO board. The protection logic disconnects the battery 60 seconds or less after the update process begins. When ac control power (or sensor power) is present, the control continues to operate without battery power and completes the software update. However, if ac control power (or sensor power) is *not* present, the control shuts down, terminating the software update. There is no damage to the control, and the update process can be started again.

### Manually Overriding the Battery Disconnect Command

You can update the Control software using only battery power by manually sending a “battery on” command to the PS/IO board. To do so, press the **BAT ON** switch every 30 seconds. This white momentary-contact switch is located on the PS/IO board. See Figure 9.

Updating the Control software can take up to 15 minutes. Pushing the **BAT ON** switch every 30 seconds is mandatory during this process if there is no ac control power or sensor power supplied to the switch control.

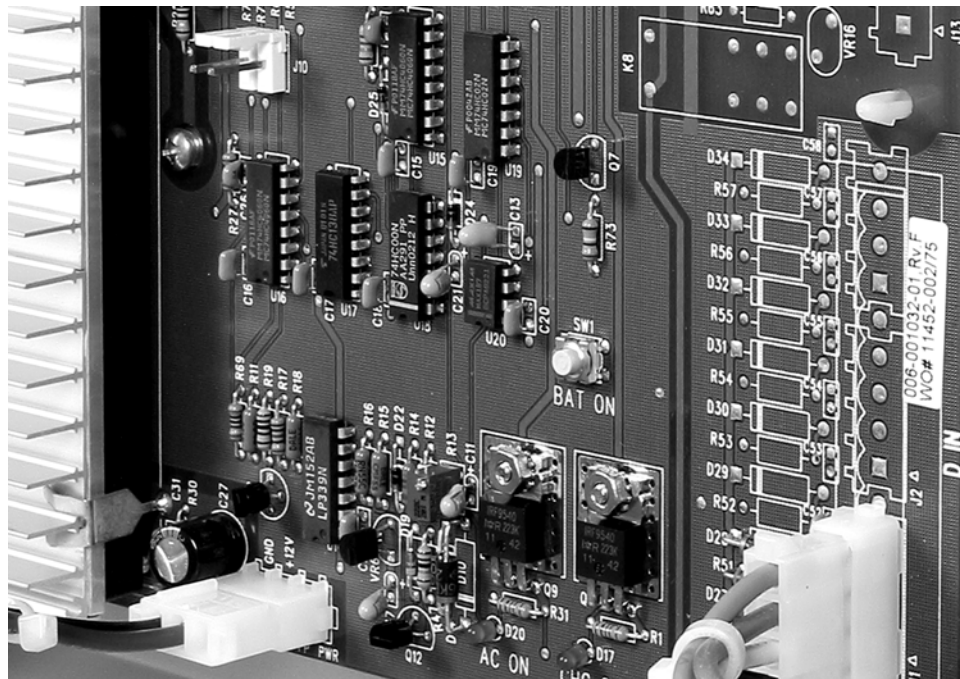


Figure 9. BAT ON push-button on the PS/IO board.



# SEND THIS INFORMATION TO S&C

## Transmit this

The following information should be sent to:

**S&C Electric Company - RMA# \_\_\_\_\_**  
**1135 Atlantic Avenue**  
**Alameda, California 94501**  
**Phone: (510) 864-6850**

Please list the serial number and replacement date of every control in which the processor board has been replaced. If you include a previously sent serial number, don't be concerned, as it will already be listed in the S&C database.

**Please also include a copy of this form with your RMA return shipment of removed processor circuit boards.**

**Company -**  
**RMA Number -**

Control Serial Number	Date	Comments

